Ecology Behind Seeding Strategies

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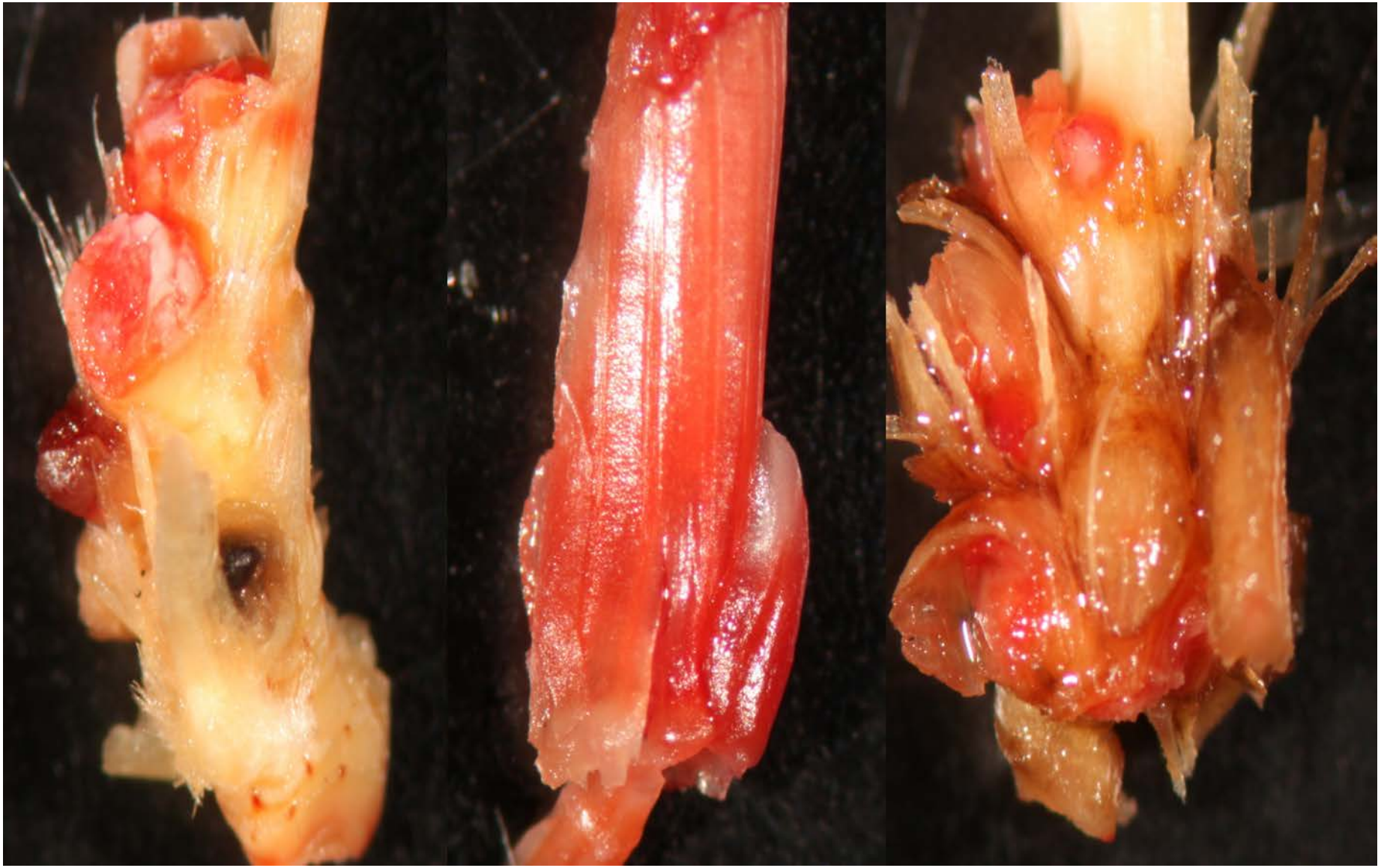
2nd Annual North Dakota Reclamation Conference
What is Successful Reclamation? Feb. 24-25, 2014



Three Points

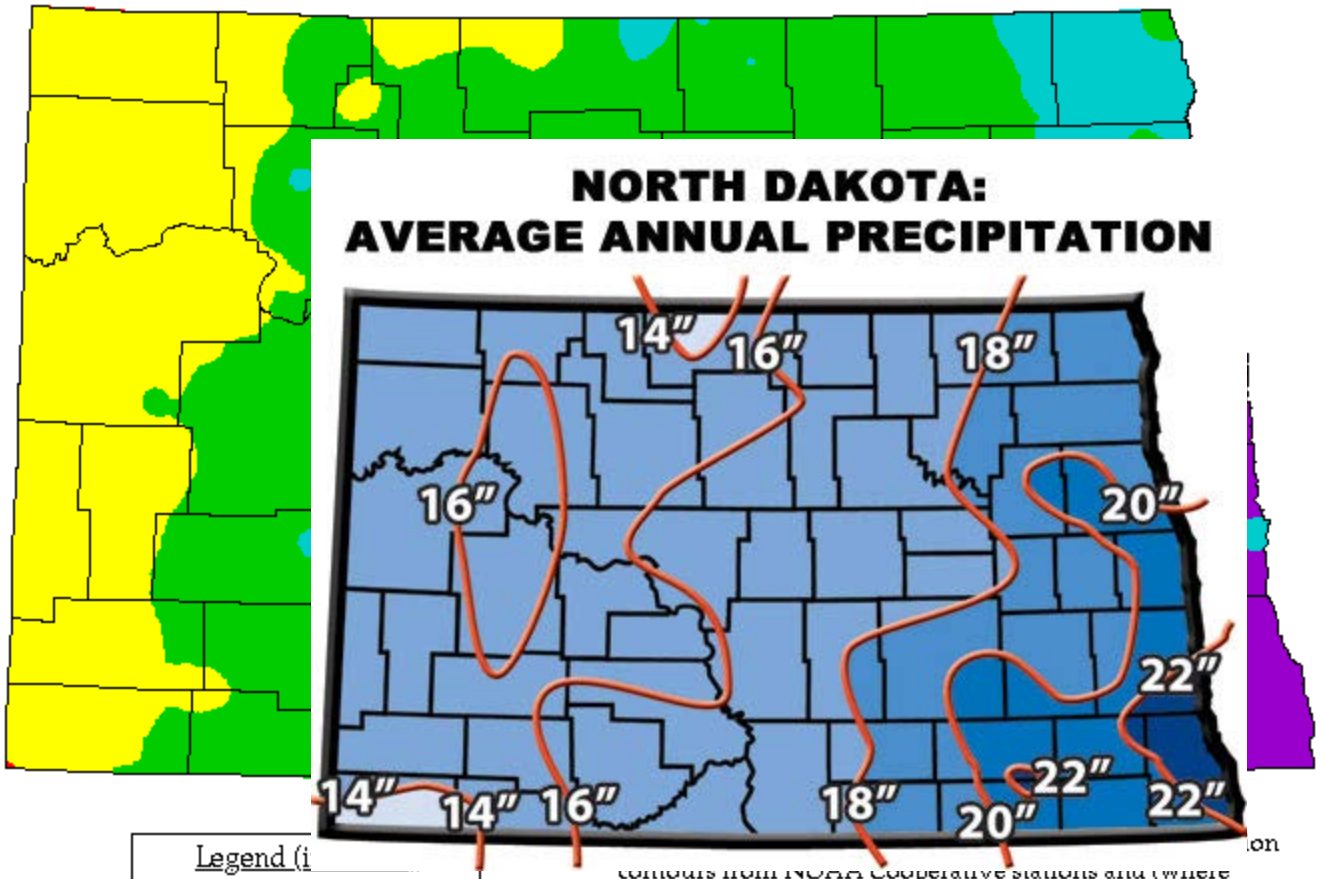
- If it can’t grow there don’t think it will.
- Be aware of your surroundings.
- Best Reclamation = No Reclamation.

If It Can't Grow There Don't Think It Will

- Plants require 4 things for growth
  - Light– Won't discuss
  - Water
  - Temperature
  - Nutrients– Soil
    - Site

Average Annual Precipitation

North Dakota



...on

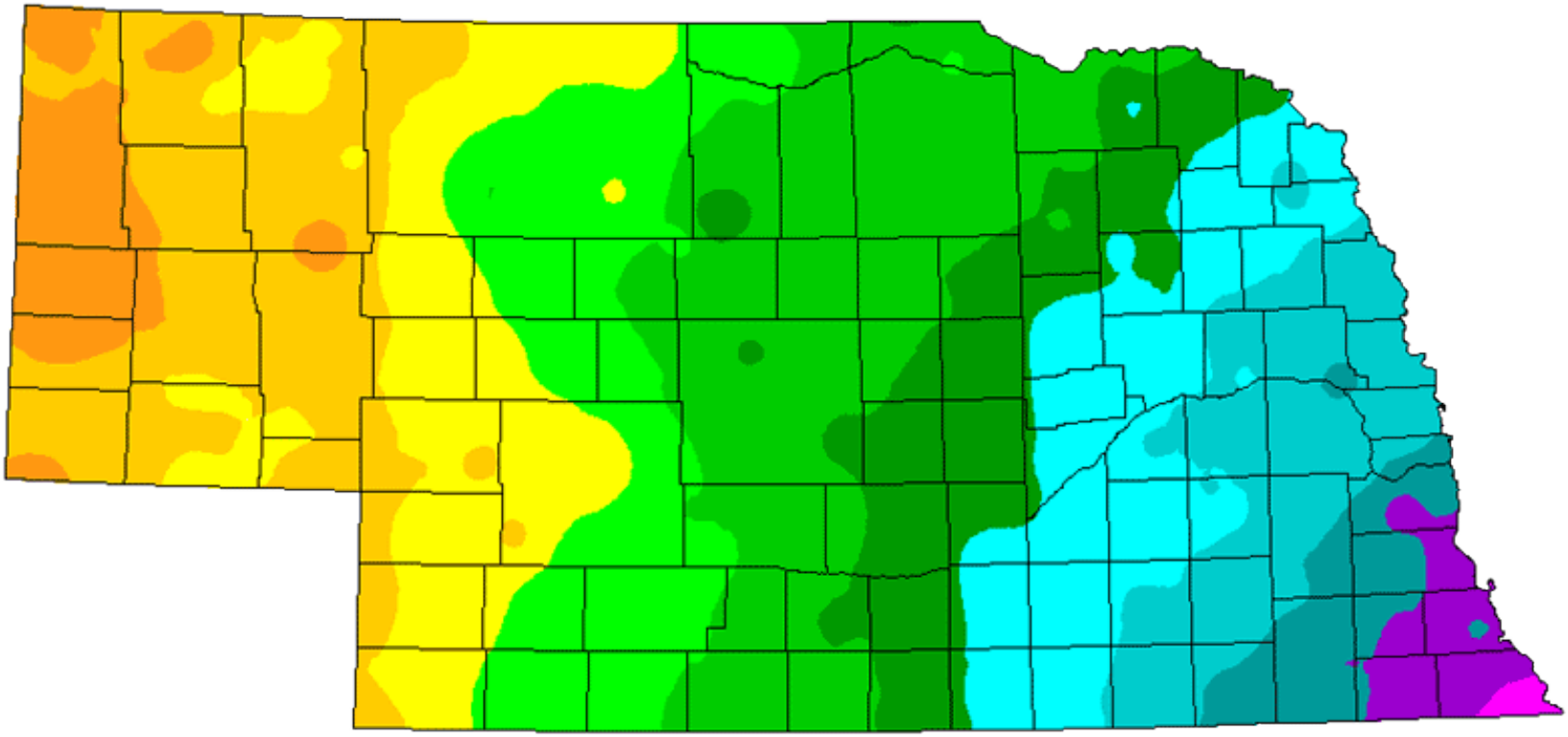
...contours from NOAA Cooperative stations and (where appropriate) NRCS SNOTEL stations. Christopher Daly used the PRISM model to generate the gridded estimates from which this map was derived; the modeled grid was approximately 4x4 km latitude/longitude, and was resampled to 2x2 km using a Gaussian filter. Mapping was performed by Jenny Weisburg. Funding was provided by NRCS Water and Climate Center.

12/7/97

Average Annual Precipitation

Average Annual Precipitation

Nebraska



Legend (in inches)

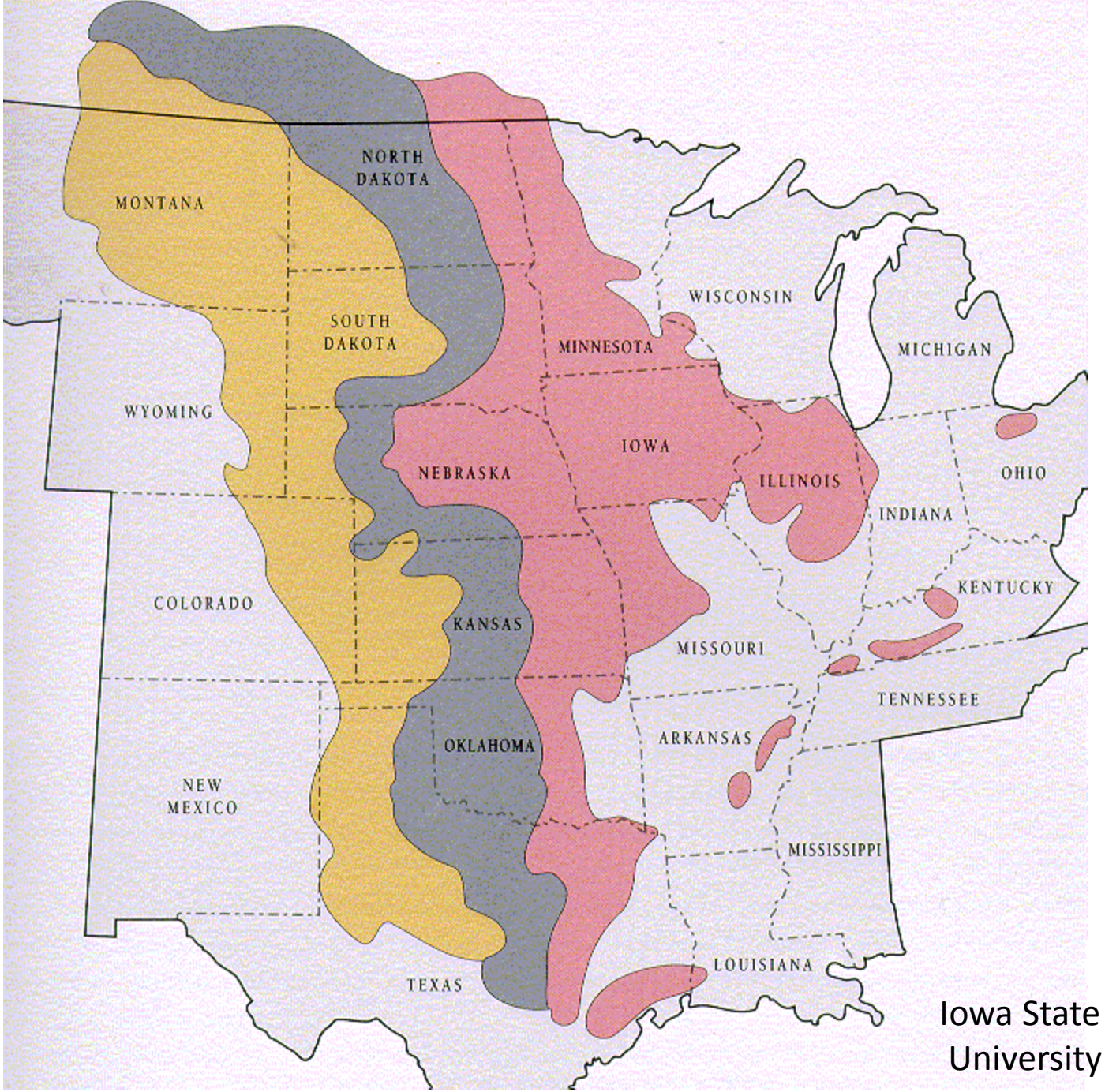
Under 16	26 to 28
16 to 18	28 to 30
18 to 20	30 to 32
20 to 22	32 to 34
22 to 24	Above 34
24 to 26	

This is a map of annual precipitation averaged over the period 1961-1990. Station observations were collected from the NOAA Cooperative and USDA-NRCS SnoTel networks, plus other state and local networks. The PRISM modeling system was used to create the gridded estimates from which this map was made. The size of each grid pixel is approximately 4x4 km. Support was provided by the NRCS Water and Climate Center.

For information on the PRISM modeling system, visit the SCAS web site at http://www.ocs.orst.edu/prism

The latest PRISM digital data sets created by the SCAS can be obtained from the Climate Source at http://www.climatesource.com

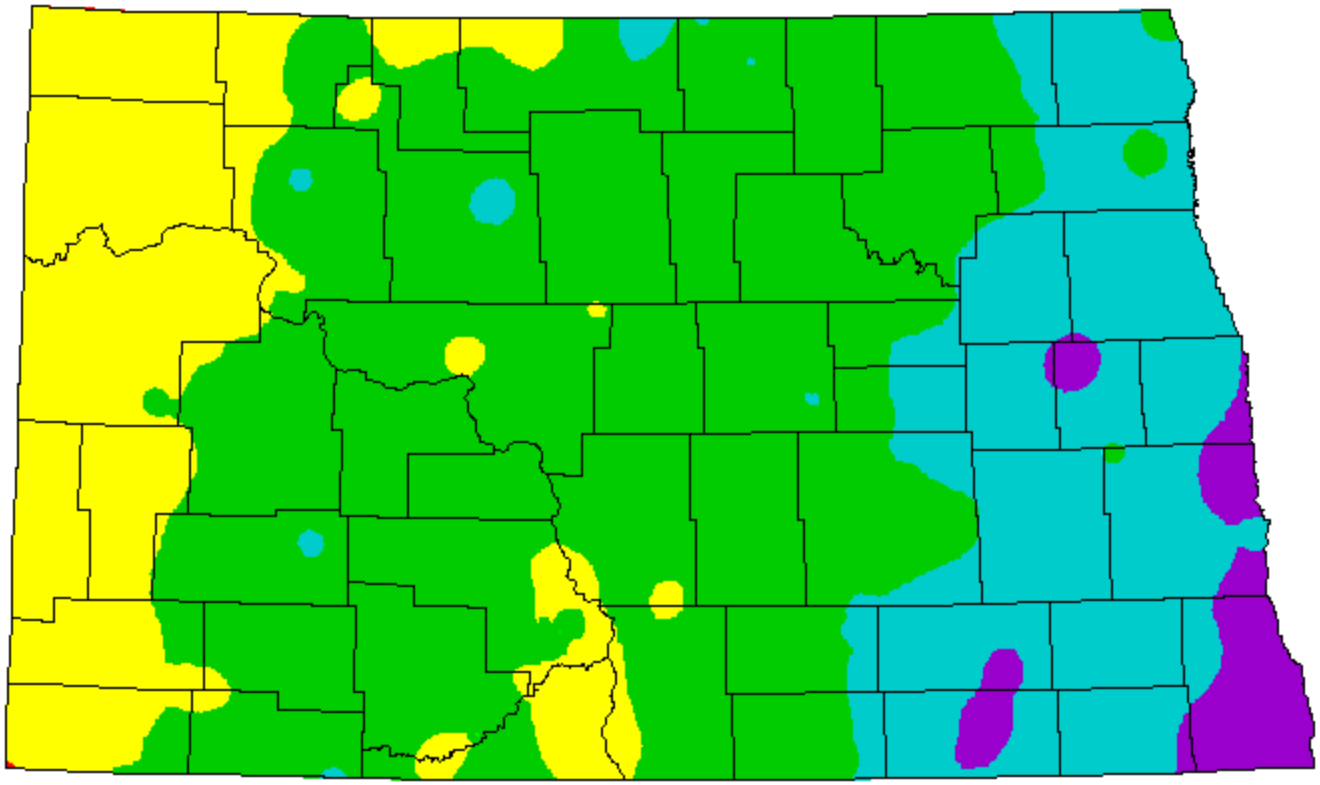

www.mn.gov



Iowa State University

Average Annual Precipitation

North Dakota



Legend (in inches)

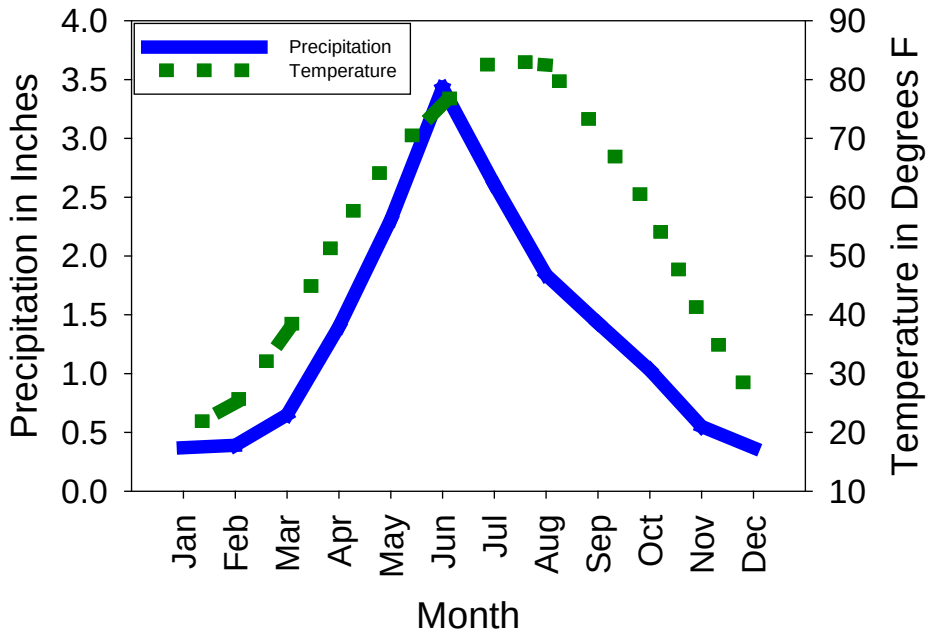
- Under 15
- 15 to 17
- 17 to 19
- Above 19

This map is a plot of 1961-1990 annual average precipitation contours from NOAA Cooperative stations and (where appropriate) NRCS SNOTEL stations. Christopher Daly used the PRISM model to generate the gridded estimates from which this map was derived; the modeled grid was approximately 4x4 km latitude/longitude, and was resampled to 2x2 km using a Gaussian filter. Mapping was performed by Jenny Weisburg. Funding was provided by NRCS Water and Climate Center.

12/7/97

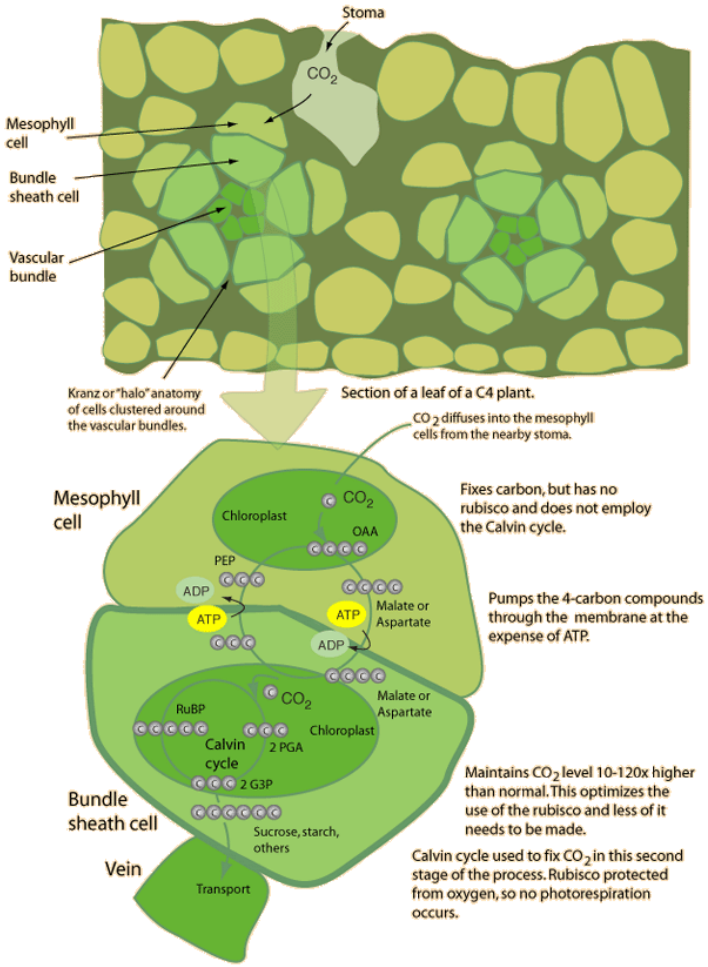
Precipitation

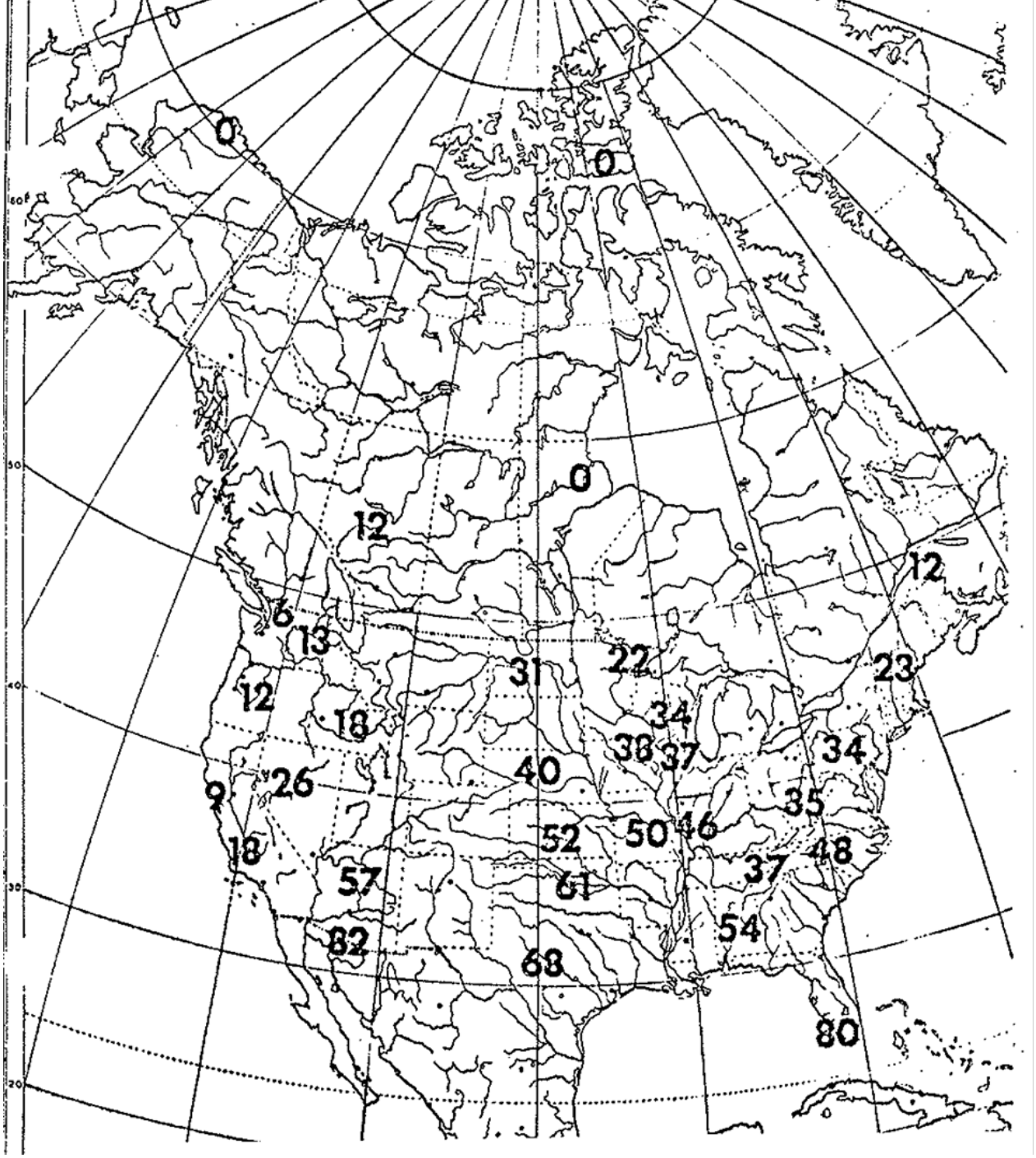
- Match Species with precipitation.
- North Dakota more productive than other areas because rain comes at good time.



Temperature

- Plants are split into 3 groups based on photosynthetic pathway
  - C_4 Plants = Warm-Season
  - C_3 Plants = Cool-Season
  - CAM Plants = Cacti





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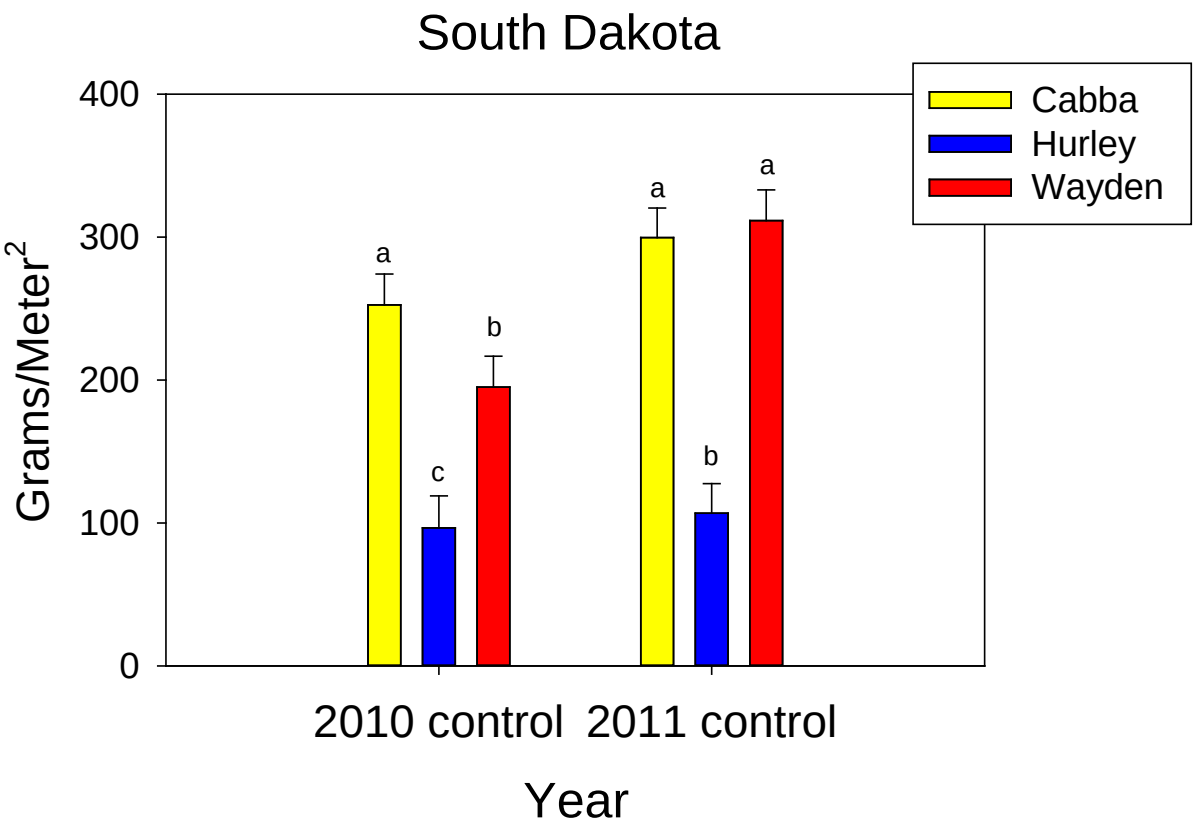
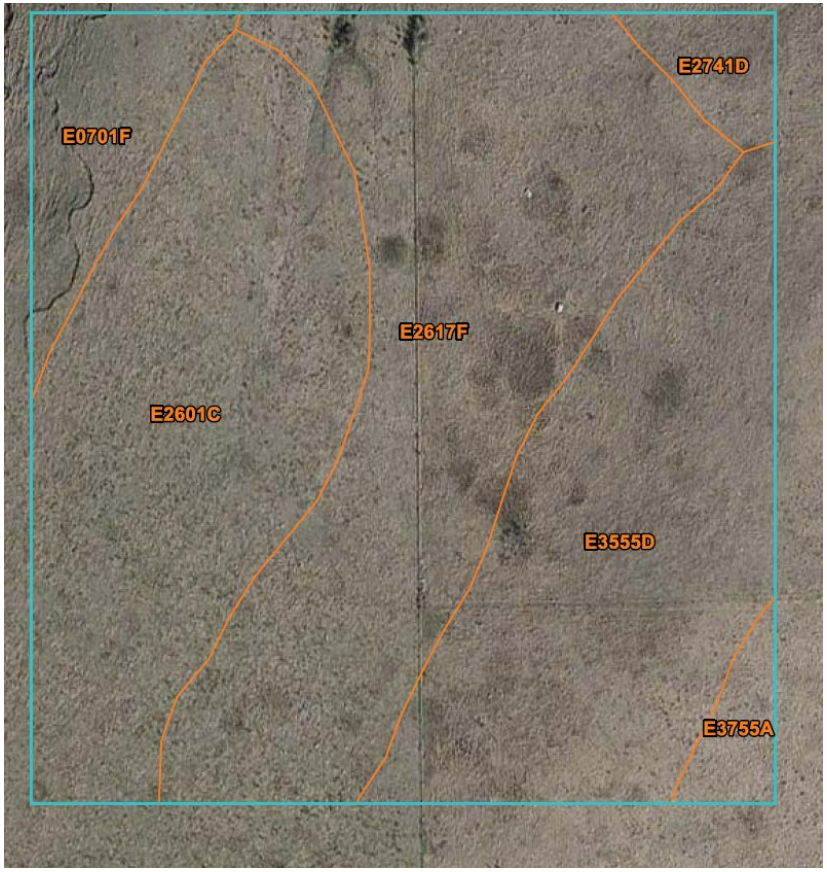
Nutrients

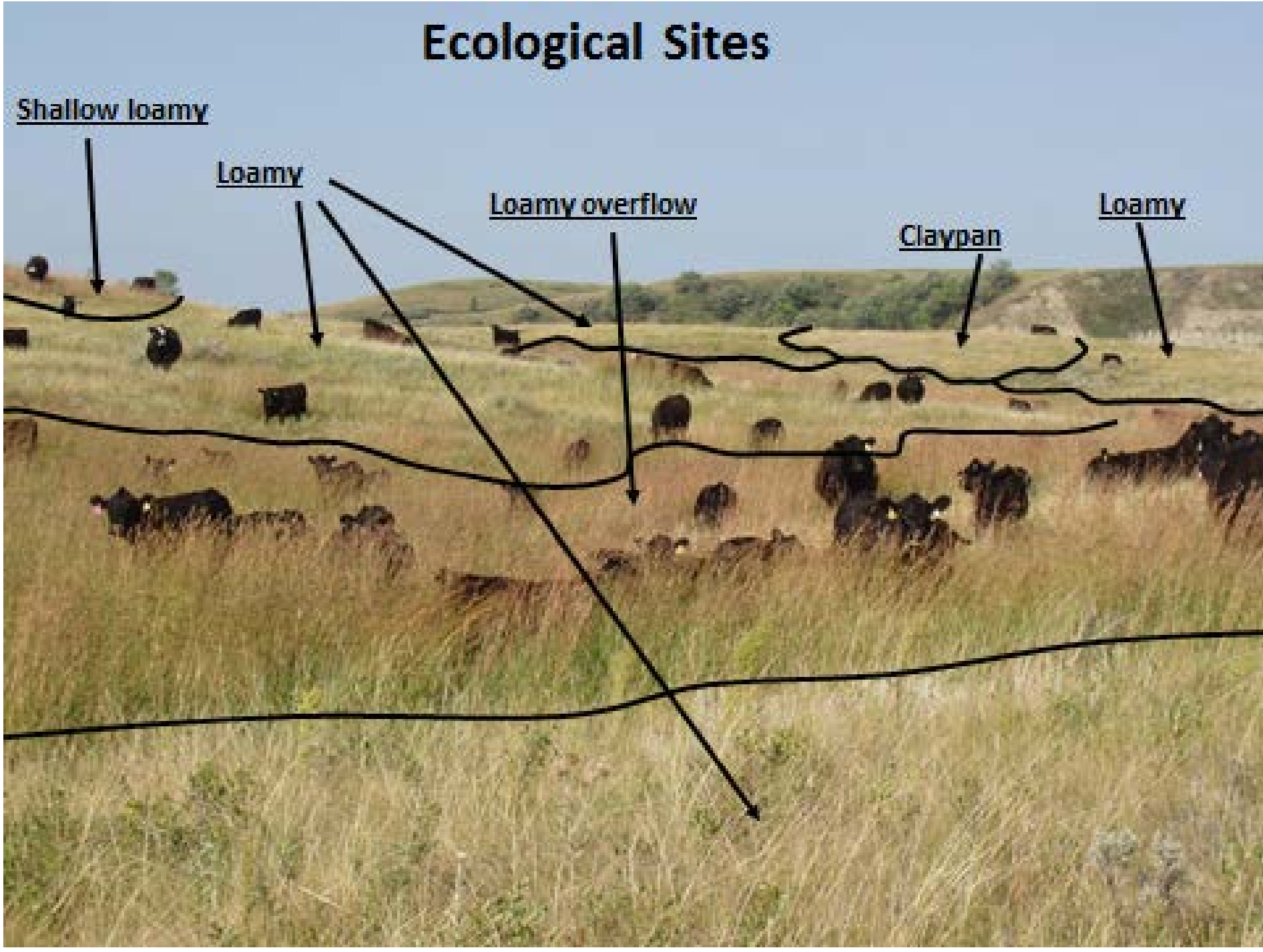
- Soils
- Produ
- Site Sp
- NRCS
  Ecolog
  - Base
    and



Soils Provide Nutrients

- Ecological Site Descriptions (ESD)
  - Provide information on Soils and Plant Communities
  - Available from NRCS
    - Web Soil Survey– Gets started
    - Need to dig to determine ESD




Ecological Sites
Shallow loamy
Loamy
Loamy overflow
Claypan
Loamy

Be Aware of Your Surroundings

Photo from
USDA-NRCS

Be Aware of Your Surroundings

- Adjacent Land Use
- Match the dominance.
  - Don’t put a strip of introduced species in an area dominated by natives.
  - Be aware of what native plants are common.

Be Aware of Your Surroundings

Native

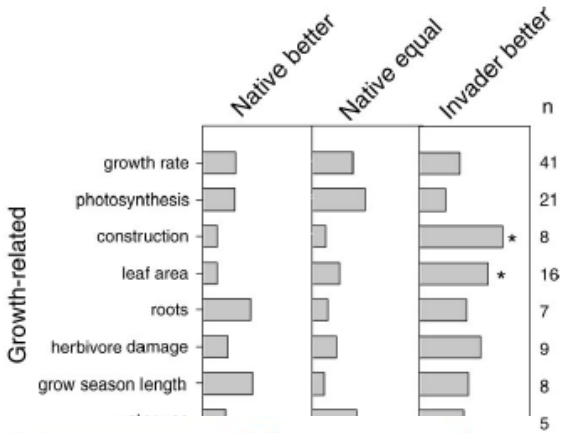
- Advantages:
  - Extend forage productivity
  - Enhance wildlife habitat
  - Increase biodiversity
    - Jefferson et al. 2005. Prairie Forum 30:85-108
- Disadvantages
  - Establishment Problems
  - Weed Issues

Introduced

- Advantages
  - Easier Establishment
  - Greater productivity in some BUT not all situations
    - Wilms et al. 2009. REM 62:53-59.
- Disadvantages
  - Invasions
  - Ecosystem Services

Be Aware of Surroundings

- Competitiveness of Natives
- Seedling Emergence



'Lodorm' green needlegrass and 'Pierre' sideoats grama (left tray in each photo) established rapidly (25 days after seeding) compared to a native harvest seed source (right tray in each photo).

Figure 3 Summary of native versus invader performance, according to whether the native performed better than (*first column*) or as well as (*second column*) the invader under some conditions, or whether the invader always performed better (*third column*). Asterisk indicates significant difference (chi-squared exact test, exact $P < 0.05$). The column to the far right (n) indicates the number of independent comparisons for each measure of performance.

Be Aware of Surroundings

Seeding – 5 Keys

- Seeding Date
- Seedbed
- Seed Placement
- Seed Quality
- Weed Control

Source- Five Keys to Successful Grass Seeding– USDA-NRCS PMC

NRCS Natural Resources Conservation Service

Helping People Help the Land

Five Keys to Successful Grass Seeding

USDA Natural Resources Conservation Service, Plant Materials Center, Bismarck, North Dakota

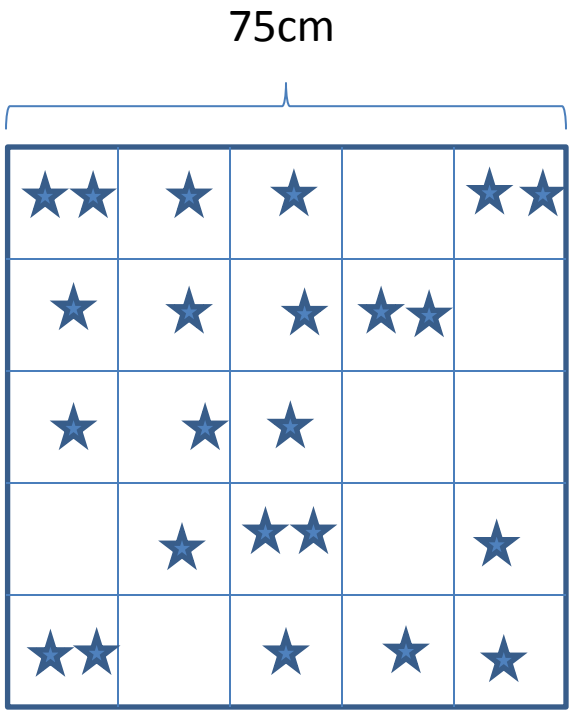
- **Seeding Date**
- **Seedbed**
- **Seed Placement**
- **Seed Quality**
- **Weed Control**

Establishing a stand of grass requires proper planning and attention to detail. Perennial grasses differ in establishment requirements compared to annual grain crops. Five keys to successful grass seeding and establishment are presented in the following narrative. Adhering to these guidelines will greatly improve your chances of a successful grass stand.

http://www.nrcs.usda.gov/Internet/FSE_PLANTMATERIALS/publications/ndpmcbr04959.pdf

Be Aware of Your Surroundings

- Management After Seeding
  - Extremely Important
  - Little Research– Relatively few herbicides etc.
  - One Year Deferment from grazing
  - Don't give up
  - Frequency Grid for Establishment
    - Values of 50% or higher = successful
    - 25-50% = Adequate
    - <25% = Partial re-establishment or unsuccessful.



Masters and Vogel. 2001. JRM 54:653-655.

Be Aware of Surroundings

- A lot to think about
  - Moisture
  - Temperature
  - Soils
- Not as bad as sounds

Native rangeland (loam, clayey and sandy soils)
Western wheatgrass (native cool-season rhizomatous grass) Green needlegrass (native cool-season bunchgrass) Canada wildrye (native cool-season bunchgrass) Sideoats grama (native warm-season rhizomatous grass) Blue grama (native warm-season bunchgrass) Purple prairieclover (native leguminous forb)

Native rangeland (sands and shallow soils)
Western wheatgrass (native cool-season rhizomatous grass) Prairie sandreed (native warm-season rhizomatous grass) Little bluestem (native warm-season bunchgrass) Canada wildrye (native cool-season bunchgrass) Blue grama (native warm-season bunchgrass) Narrow-leaf purple coneflower (native forb)

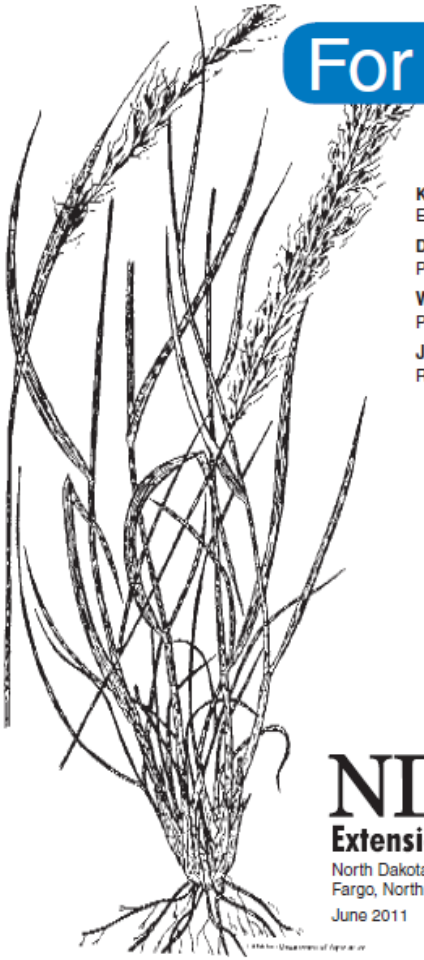
Native rangeland (saline and/or sodic affected soils)
Western wheatgrass (native cool-season rhizomatous grass) Slender wheatgrass (native cool-season bunchgrass) Canada wildrye (native cool-season bunchgrass) Blue grama (native warm-season bunchgrass) Western yarrow (native forb) Wyoming big sagebrush (native shrub) – for reclaiming sites within sage grouse habitat

Introduced pasture or hayland (all soil types)
When reestablishing tame grass pastures or hayland, use introduced species which are adapted to the soil and match the existing vegetation. This may include intermediate/pubescent wheatgrass (introduced cool-season rhizomatous grass), meadow bromegrass (introduced cool-season bunchgrass), crested wheatgrass (introduced cool-season bunchgrass), and alfalfa (introduced leguminous forb). Be aware of the potential for livestock bloat when using alfalfa in pasture mixtures.

- A lot of

R-794 (Revised)

Grass Varieties For North Dakota



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NDSU Extension Service
North Dakota State University
Fargo, North Dakota
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USDA NRCS
United States Department of Agriculture
Natural Resources Conservation Service

Best Reclamation = No Reclamation

- Minimize Disturbance
  - Don’t do more than needed
  - Avoid fragile or eroded areas
  - Minimize width and time of disturbance
- Use common sense with initiating projects needing reclamation.

Summary

- Plant mixtures appropriate to site
- Be aware of surroundings
  - Don’t plant invasive species in a native community
  - Relatively few tools for managing seeded communities
    - No grazing for at least 1 year
    - Watch for weeds and mow if needed
- Be conservative with disturbance.

Questions

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